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THE MIGRATION OF REPRODUCTIVE ORGANS FROM PARENT TO BUDS IN HYDRA.

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The germ cells of hydra, as far as we are able to interpret by means of a microscopic study of carefully prepared sections, originate directly from the ordinary interstitial cells. It is true, however, that some investigators advocate the specificity of the germ cells. But the species studied gave no evidence of a specific line of germ cells. It is not my intention to take up a careful study of the germ cells in hydra, as to their method of origin and history, but rather to consider them from the standpoint of their place of origin. That is, do the reproductive organs originate directly on the forming buds, or are they formed on the parent hydra and later migrate to the buds during their development.

Investigators have reported the presence of sex organs on the buds in hydra, but in no case has it been definitely stated that these organs originated directly from the ectoderm of the young buds on which they were found.

Fig. 1 represents a camera drawing of *Hydra vulgaris* in a partially contracted condition, with five buds in different stages of development, and thirteen spermaries. Most of the spermaries were completely formed before budding begun. In no instance did the spermaries originate directly on the buds, but migrated with the cells of the parent to those of the forming buds.

Diagram A, 1, represents a small portion of the parent hydra extended, with a bud in its initial stage of development. The area between *R-G* on either side of the bud, indicates the region of growth or the region that contributes directly to the formation of the bud. Reproductive organs found within this region (*R-G*), migrate from the parent hydra to the bud. Those outside of this region of growth never reach the bud, but in most instances retain their original position, while the buds

are developing. Those on the border line, often migrate towards the buds but never reach them. That is, they remain on the parent. The place occupied by the reproductive organs on the completely formed bud is determined by their position in the

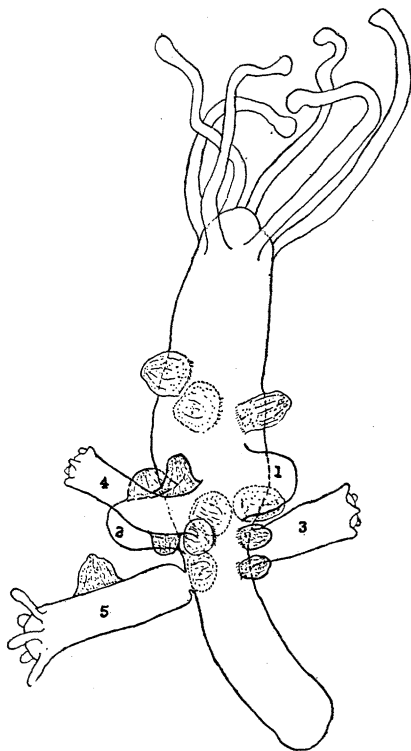
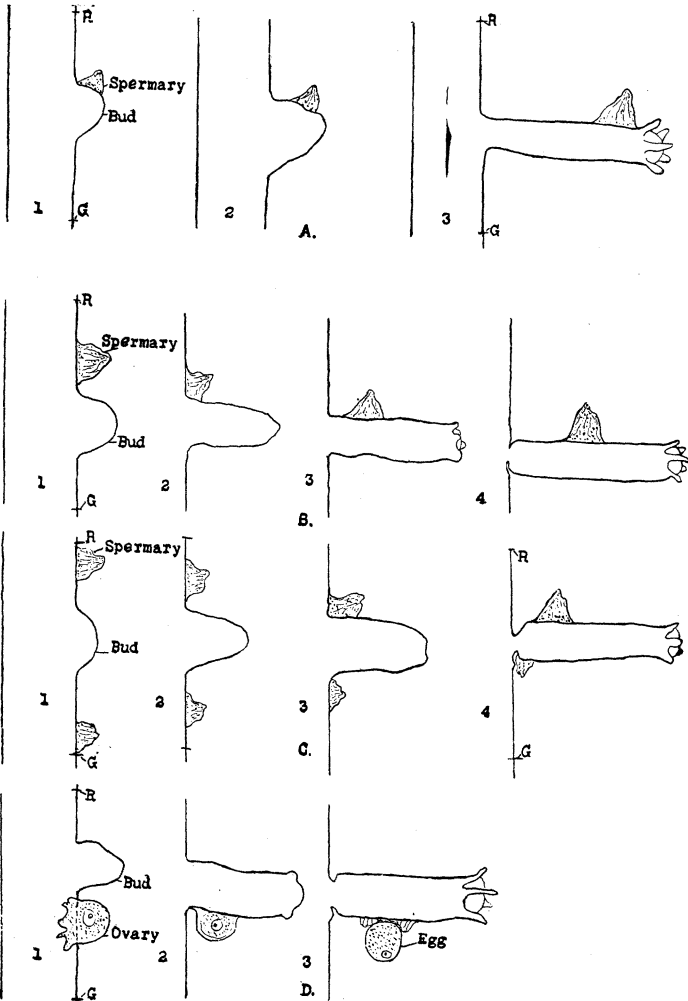


FIG. 1. Hydra with 5 buds and 13 spermaries. Spermaries have migrated from parent to buds 2, 4 and 5.

growth region (*R-G*) of the parent hydra at the time the bud starts.

Spermaries or ovaries found near the tip or center of the distal end of the bud when it makes its first appearance, take up a final position at the distal end of the completely formed bud (Diagram A, 3). The spermary (Diagram A, 1-3) during the different stages of progress in the development of the bud, retains its same position with reference to the tip or distal end. In Diagram A the bud became independent of the parent in sixty hours after its initial stage of development. Diagram B,

1, 2, 3 and 4 shows the position of the spermary at different periods of growth on the bud, and its final position when the bud is completely formed. Note the position of the spermary



DIAGRAMS A, B, C and D to show the migration of reproductive organs from parent hydra to the forming buds.

before its migration began. In Diagram C, 1, 2, 3 and 4 the spermaries were located near the outer edge of the region of growth (R-G). The time required for the development of the

bud in Diagram C was seventy hours. Diagram D, 1, 2 and 3 shows the position taken by the ovary, at the different stages in the development of the bud. The rate of growth and migration of the ovary is the same as in the case of the spermary.

The position taken by the reproductive organs during the different periods of growth in the formation of the buds, indicate beyond question, that the region around the base of the buds, contributes almost entirely to the formation and growth of the buds, and that the cells of the buds contribute but little to their own development. The cells in the growth region not only divide mitotically, but migrate from the parent hydra to the buds and carry the reproductive organs with them.

It was not an unusual thing to find hydra that were produced by budding in the different cultures, which showed either ovaries or spermaries at their extreme distal or proximal end. Diagrams A, 3, and C, 4, are good examples of these conditions.

In a few instances where the spermary was situated equidistant between two forming buds, the spermary became divided through the central region, either half reformed into a distinct spermary and migrated towards the corresponding bud. In these particular cases the spermaries were in their early stages of development. But in those spermaries that were completely formed and contained mature sperm, no division occurred. They either remained in their former position equidistant between the two buds, or migrated in toto towards one or the other.

The migration of the reproductive organs as observed in hydra is rather an interesting phenomenon, and occurs quite frequently, especially in budding hydra that are rich in sex organs. This process of migration however, is directly associated with asexual reproduction and can not be considered as having any very special significance, since the reproductive organs migrate in conjunction with the surrounding cells and not independently of them.

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